

Essentials of Integrated Anatomy

(Objective Practical Questions and Answers)



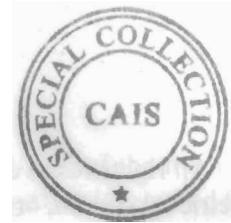
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2010

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Essentials of Integrated Anatomy

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Preface

This book is prepared to help the students studying in Phase 1 part of the medical curriculum at FMHS, UNIMAS, gain basic anatomical knowledge that is required for physical examination and diagnosis of diseases.

The format of the book reflects the Objectively Structured Practical Examination (OSPE) conducted in our faculty (FMHS, UNIMAS) where the basic sciences are integrated with the clinical sciences through the Problem-Based Learning (PBL) approach. This format helps the students to learn not only gross anatomy, but also other branches of anatomy namely histology, embryology and neuroanatomy in an integrated and applied manner.

There are 75 illustrations in this book, comprising photographs of anatomy models and bones, hand drawings and photomicrographs of paraffin embedded tissue specimens that are part of teaching materials at our faculty (FMHS, UNIMAS). The photomicrographs were made by using DIMAS-Digital Image Measurement and Analysis System, Professional Edition, Version 4, a versatile software program that allows actual images seen in the light microscope to be captured on the video camera.

Each station in this book deals with not only anatomy and allied sciences, but also with physiology, biochemistry, orthopaedics and general medicine so that students have to think of each question or station in an integrative manner before they attempt an answer.

We hope that the OSPE stations in this book will serve as models for constructing OSPE stations in the future as the integrative nature of each station is shown. We also believe that students will gain much by using this book in learning not only anatomy and allied sciences but also other basic medical sciences and clinical medicine.

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We must mention Mr. Albert Jugah Paon, Chief technician of the Anatomy Laboratories, FMHS, UNIMAS, for providing us with the excellent models, specimens and microscopes for us to photograph. Our acknowledgement will not be complete without mentioning the role played by our students for which this small work is dedicated. They provided us with the stimulus necessary to write this book and feedback to improve every station and photograph. We are therefore very grateful to our students.

Lastly, but not the least, we also like to thank many people who encouraged us to write, who assisted us in any way and whose comments brought improvement to our work. So thank you very much to our friends and colleagues.

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Professor Dr Maung Maung Nyo

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Chapter 1 The Tissues of the Body

Station No.: 1.1

Study the photomicrograph of the epithelium.

1.1 Identify the type of epithelium.

(2 marks)

Stratified squamous epithelium (non-keratinized)

1.2 List THREE histological features of the above identified type of epithelium.

(3 marks)

(i) Many layer of squamous cells with nucleus in the center of each cell.

(ii) Cell size become flatter as it becomes superficial.

(iii) Cells in contact with the basement membrane are cuboidal in shape with darkly stained nucleus.

1.3 Name TWO organs where the above epithelium can be found.

(2 marks)

(i) Oesophagus

(ii) Vagina

1.4 State the main function of the above type of epithelium.

(1 mark)

Protection: Resistance against wear and tear

1.5 List TWO other types of epithelium that are composed of many layers of cells and the location for each type.

(2 marks)

Type of epithelium

Location

(i) Transitional epithelium

- Urinary Tract

(ii) Stratified Cuboidal/columnar epithelium

- Lining of large ducts of sweat glands and salivary glands

Study the photomicrograph of the epithelium.

1.1 Identify the type of epithelium. (2 marks)

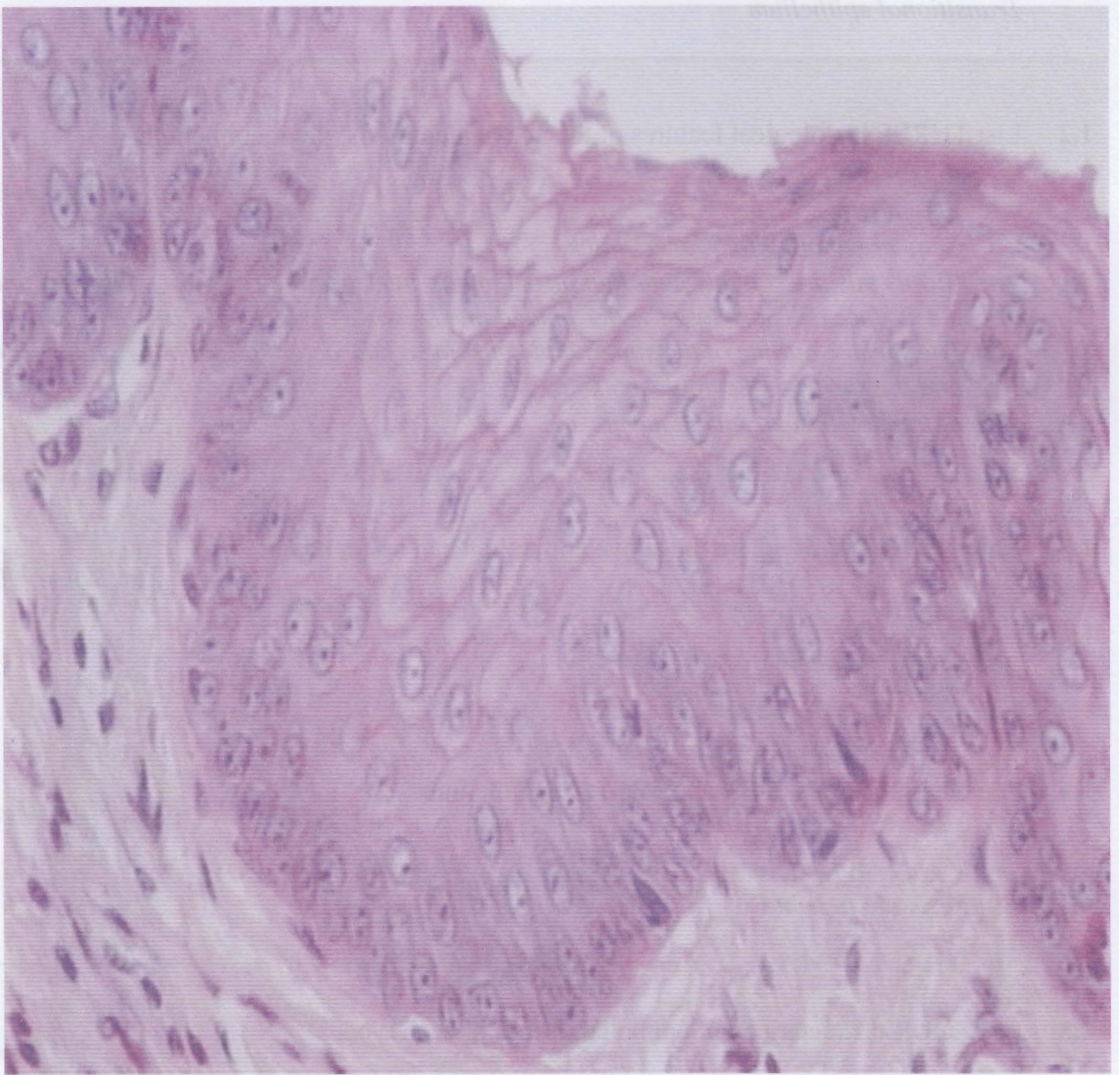


Figure 1.1 Photomicrograph of a type of epithelium

Study the photomicrograph of the epithelium.

- 1.1** Identify the type of epithelium. (2 marks)

Transitional epithelium

- 1.2** List THREE histological features of the above identified type of epithelium. (3 marks)

- (i) Cells are about 3 to 5 layers thick.
 - (ii) Basal cells are roughly cuboidal or columnar, intermediate cells are polygonal and the surface cells are large with rounded nuclei, some surface cells are binucleate. The surface outline of the superficial cells has a characteristic scalloped appearance and the superficial cytoplasm is fuzzy.
 - (iii) Extremely thin basement membrane.
-

- 1.3** Name TWO organs where the above epithelium can be found. (2 marks)

- (i) Ureter
 - (ii) Urinary bladder
-

- 1.4** State the properties of the above type of epithelium. (1 mark)

- (i) Highly stretchable
 - (ii) Resistant to urine
-

- 1.5** List FOUR characteristic of epithelial tissues of each type. (2 marks)

- (i) closely aggregated cells with minimal extracellular matrix
 - (ii) lies on a basement membrane
 - (iii) always have a free surface
 - (iv) lack blood vessels (avascular)
 - (v) regenerate readily
- (Any 4)
-

Study the photomicrograph of a muscle tissue.

Date : 13/04/2006 Time : 2:21:30 PM



Figure 1.2 Photomicrograph of a type of epithelium

Station No.: 1.3

Study the photomicrograph of a muscle tissue.

1.1 Identify the type of muscle.

(2 marks)

Skeletal muscle

1.2 List THREE histological features of the type of muscle identified in 1.1.

(3 marks)

(i) *Cells are long, cylindrical and striated*

(ii) *Cells are multinucleated and nuclei are located at the periphery of the cells*

(iii) *Cells are arranged in parallel bundles*

1.3 State the THREE connective tissue sheaths associated with the above muscle tissue.

(3 marks)

(i) *Epimysium*

(ii) *Perimysium*

(iii) *Endomysium*

1.4 Name the embryonic germ layer that gives rise to muscle tissue.

(1 mark)

Mesoderm

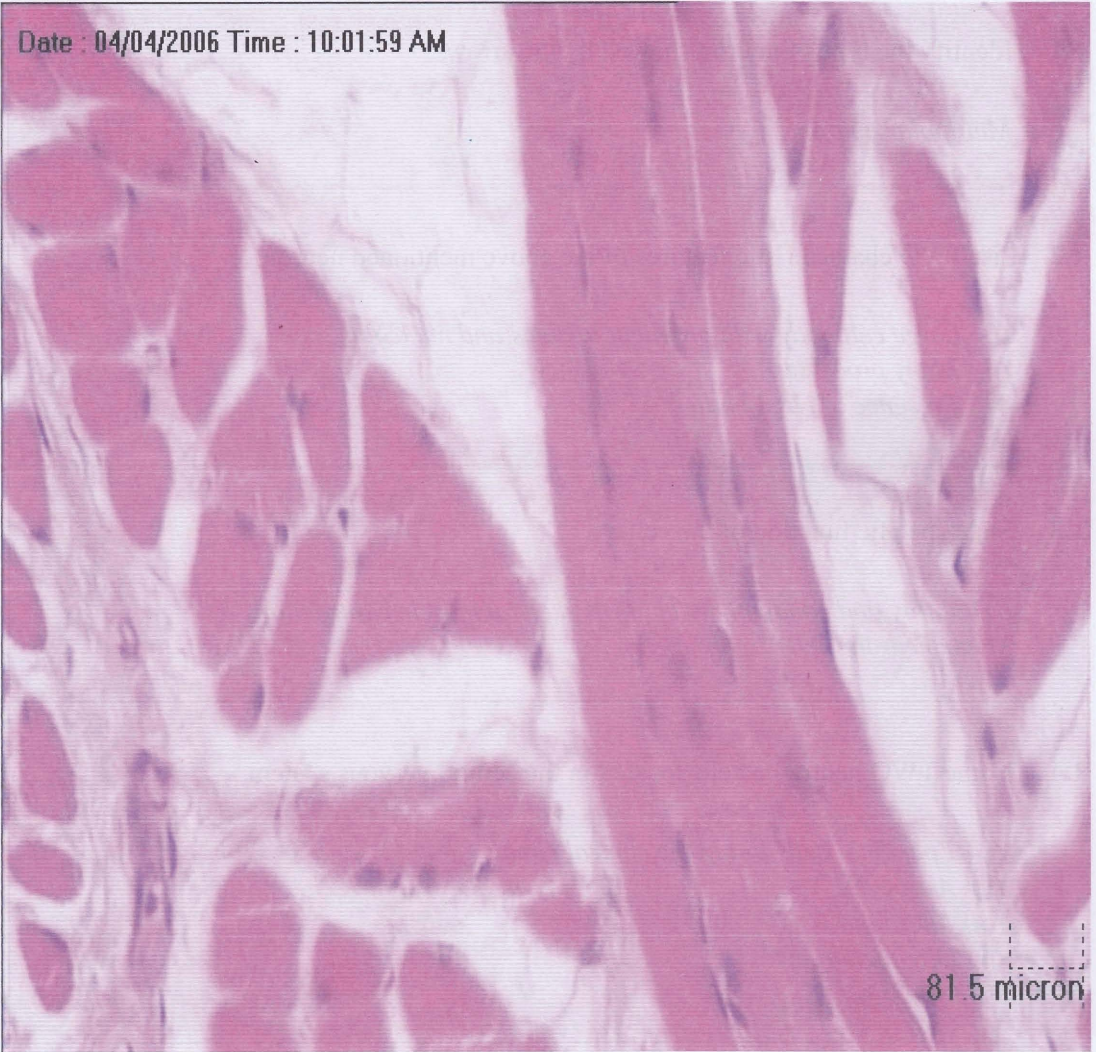
1.5 Name TWO contractile proteins of muscle tissue.

(1 mark)

(i) *Actin*

(ii) *Myosin*

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81.5 micron

Figure 1.3 Photomicrograph of a type of muscle

Study the slide of a nervous tissue stained by H&E.

- 1.1** Identify the type of neuron showed by the arrow. (2 marks)

Multipolar neuron

- 1.2** List TWO characteristic features of the above mentioned neuron. (2 marks)

- (i) *Large cell body with prominent nucleus and nucleolus.*
 - (ii) *Many processes*
 - (iii) *Presence of Nissl bodies*
-

- 1.3** State specific function of the cell. (2 marks)

Irritability and conductivity/controls skeletal muscle contraction.
Motor neuron

- 1.4** Name TWO neuroglia cells located in the central nervous system. (2 marks)

- (i) *Ependymal cells lining the central canal*
 - (ii) *Astrocytes*
 - (iii) *Microglia*
 - (iv) *Oligodendrocytes*
- (Any two)*
-

- 1.5** List TWO other types of neurons and state the function of each type. (2 marks)

<i>Type of neuron</i>	<i>Function</i>
(i) <i>pseudounipolar neuron</i>	<i>sensory neuron</i>
(ii) <i>bipolar neuron</i>	<i>special sensory neuron</i>

Study the model/diagram.

1.1 Identify the structure

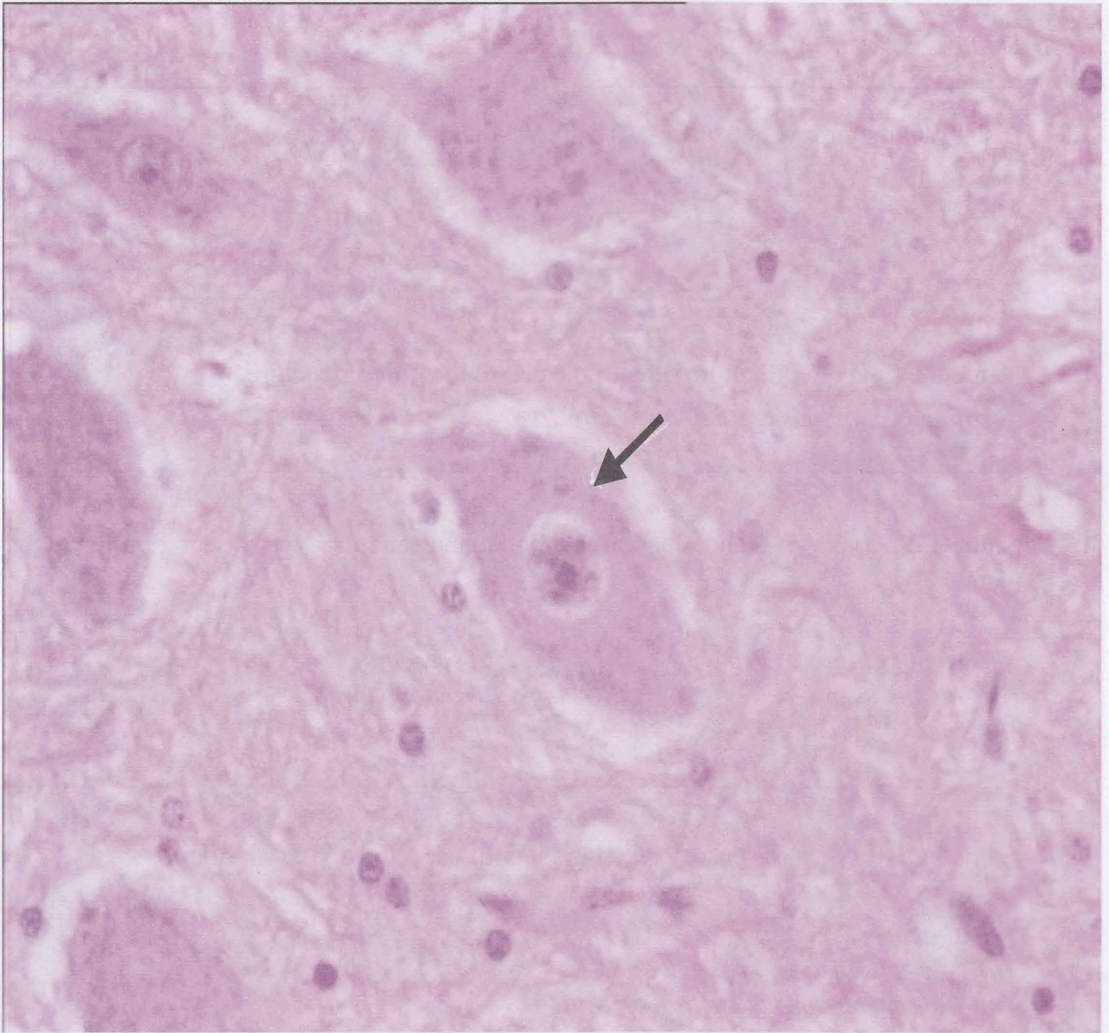


Figure 1.4 Photomicrograph of a type of neuron

- 1.6 List FOUR functions of the above identified structure
- (i) Protection
 - (ii) Sensation
 - (iii) Thermoregulation
 - (iv) Protein/D synthesis, etc

Study the model/diagram.

1.1 Identify the structure. (2 marks)

Skin

1.2 List TWO major layers that form the above identified structure. (2 marks)

- (i) *Epidermis*
- (ii) *Dermis.*

1.3 Name the type of epithelium seen in the above identified structure. (2 marks)

Stratified squamous epithelium keratinized

1.4 Name TWO types of glands seen in the model and state the type of secretion for each gland. (2 marks)

<i>Type of gland</i>	<i>Type of secretion</i>
(i) <i>Sebaceous gland</i>	<i>sebum, a lipid mixture</i>
(ii) <i>Sweat gland</i>	<i>sweat, watery secretion</i>

1.5 Name FOUR types of sensory receptors identified in the above structure. (2 marks)

- (i) *Free nerve endings*
- (ii) *Merkel's disc*
- (iii) *Meissner's corpuscle*
- (iv) *Pacinian corpuscle*

1.6 List FOUR functions of the above identified structure. (2 marks)

- (i) *Protection*
- (ii) *Sensation*
- (iii) *Thermoregulation*
- (iv) *Vitamin D synthesis, etc*

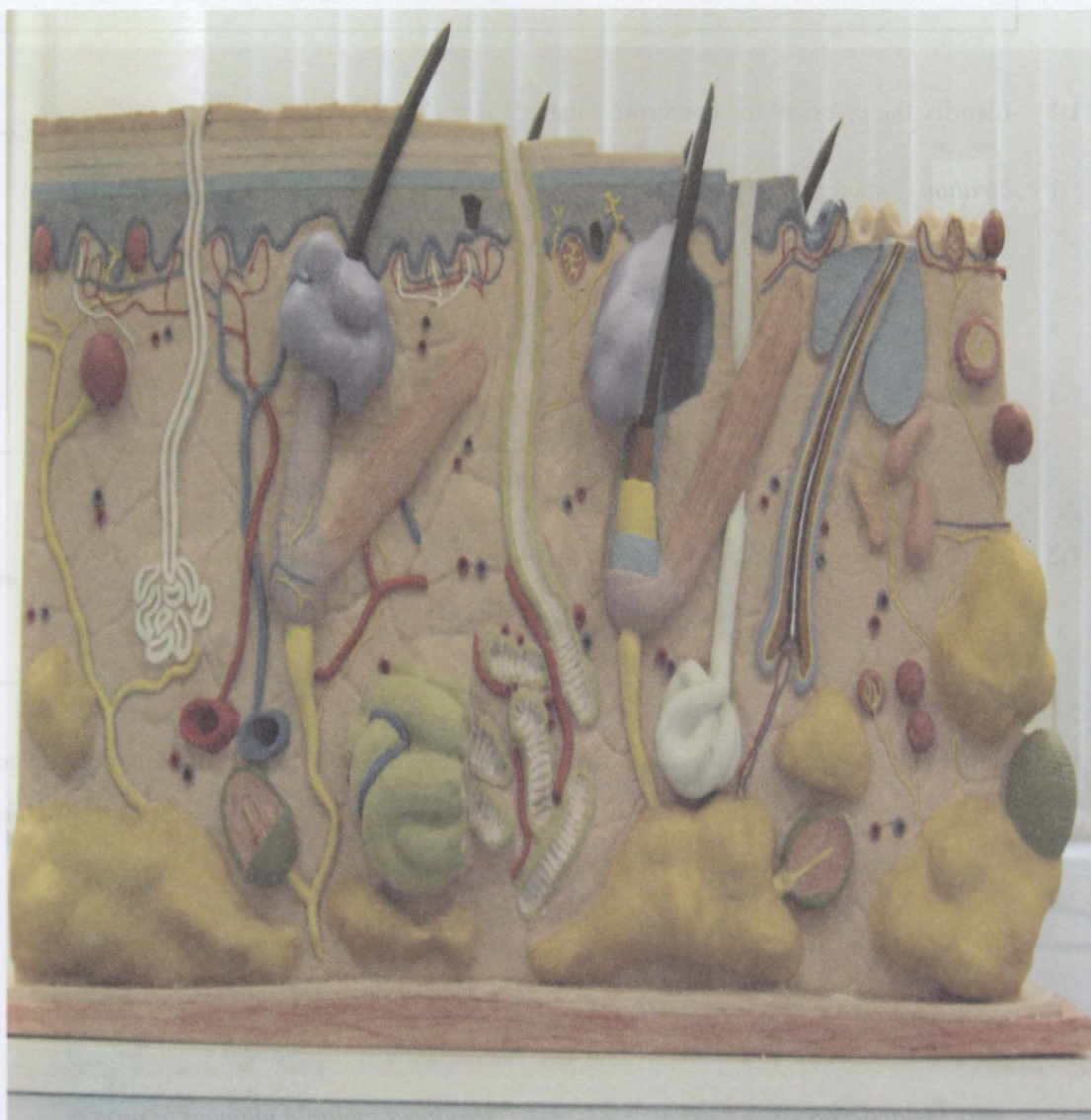


Figure 1.5 A photograph of a model

Station No.: 1.6

Study the photomicrograph of the epidermis.

1.1 Identify the layers of the epidermis labeled '1'; '2'; '3'; and '4'. (4 marks)

- 1 *Stratum corneum*
 - 2 *Stratum granulosum*
 - 3 *Stratum spinosum*
 - 4 *Stratum germinativum*
-

1.2 Name the embryonic germ layer that gives rise to the epidermis. (2 marks)

Ectoderm

1.3 Name FOUR types of cell present in the epidermis and state the specific function of each type. (4 marks)

Type of cell	Function
(i) Keratinocytes	Produces the protein keratin that helps to protect the skin
(ii) Langerhan's cells	Antigen presenting cell
(iii) Melanocytes	Produces melanin pigment to protect the skin from ultra violet rays
(iv) Merkel cells	Associated with a disc-like sensory ending

Study the photomicrograph of a type of cartilage.

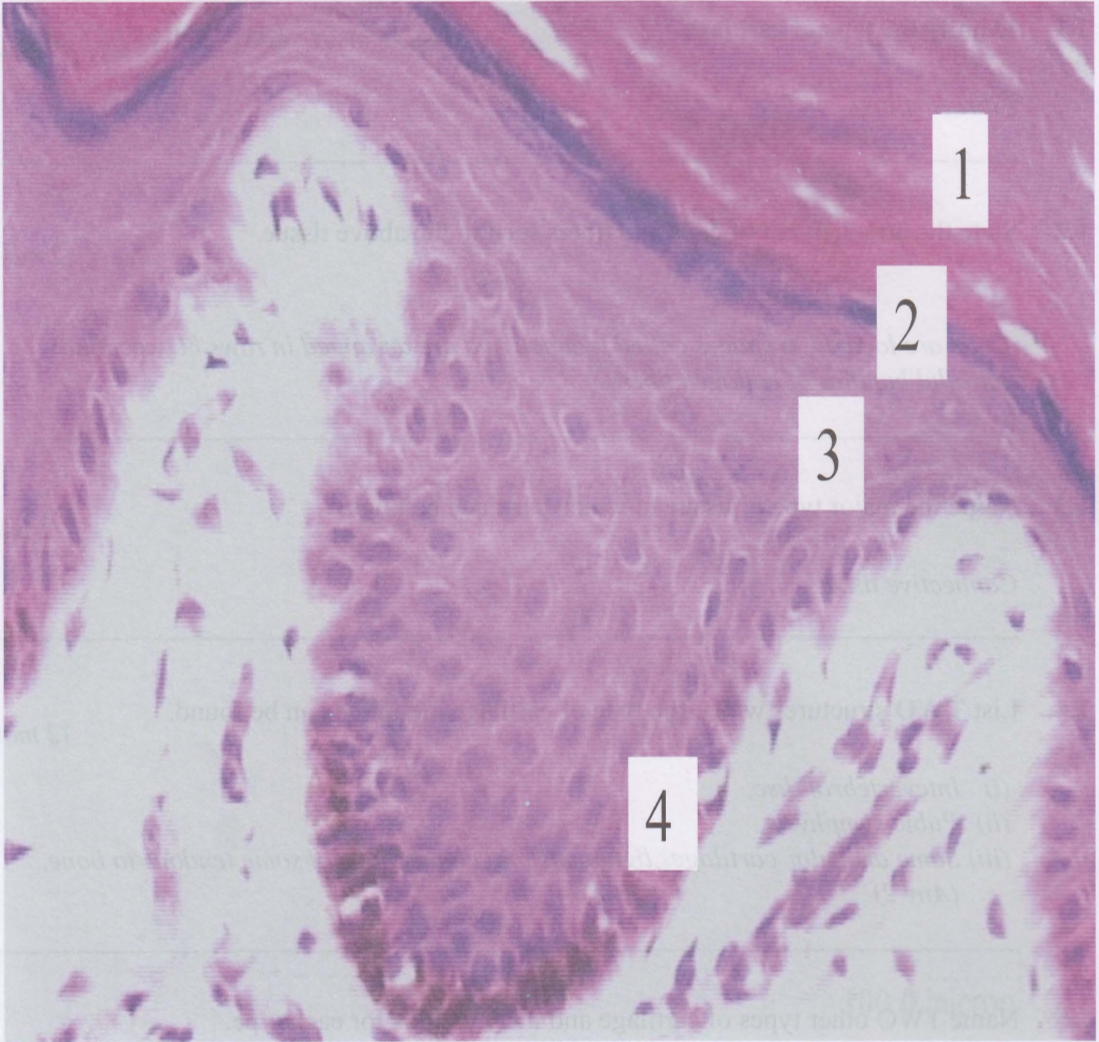


Figure 1.6 Photomicrograph of epidermis

Study the photomicrograph of a type of cartilage.

1.1 Identify the type of cartilage.

(2 marks)

Fibrocartilage

1.2 State the arrangement of cells and fibers seen in the above tissue.

(2 marks)

Cells are located in spaces called lacunae and are arranged in rows between the parallel bundles of collagen fibers.

1.3 Name the major type of tissue to which cartilage belongs.

(1 mark)

Connective tissue

1.4 List **TWO** structures where the type of cartilage identified can be found.

(2 marks)

- (i) *Intervertebral disc,*
 - (ii) *Pubic symphysis,*
 - (iii) *Some articular cartilages, ligaments and connections of some tendons to bone.*
- (Any 2)
-

1.5 Name **TWO** other types of cartilage and the locations for each type.

(3 marks)

<i>Type of Cartilage</i>	<i>Location</i>
(i) <i>Elastic cartilage</i>	<i>external ear, epiglottis, parts of laryngeal cartilages and wall of auditory tube</i>
(ii) <i>Hyaline cartilage</i>	<i>nasal septum, tracheal rings, most articular surfaces, sternal end of ribs</i>

Study the photomicrograph of a gland present in the skin.

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Figure 1.7 Photomicrograph of a type of cartilage

Figure 1.8 Photomicrograph of a section of skin showing a network of collagen fibers

1.8. Mention TWO other types of gland present in the skin.

1. Sebaceous gland
2. Sweat gland

Study the photomicrograph of a gland present in the skin.

1.1 Identify the gland.

(2 marks)

Sebaceous gland

1.2 State the histological feature of the above identified gland .

(2 marks)

It is a branched acinar gland composed of lobules of large polyhedral pale staining cells containing lipid droplets and a small dark staining central nuclei. The lipid has been removed during tissue preparation leaving the cytoplasm poorly stained.

1.3 State the **mode or pattern** of secretion of the gland identified in 1.1.

(1 mark)

Holocrine (discharged by degeneration of cells and releasing their contents into the hair follicle).

1.4 State the **nature** and **function** of the secretion produce by the gland identified in 1.1.

(1 mark)

*Oily secretion called sebum.
Lubrication & bactericidal*

1.5 Name TWO structures seen in the photomicrograph which are closely associated to form a unit with the gland identified in 1.1.

(2 marks)

*(i) Arrector pili muscle
(ii) Hair follicle*

1.6 Mention TWO other types of gland present in the skin.

(2 marks)

*(i) Merocrine Sweat glands
(ii) Apocrine glands*

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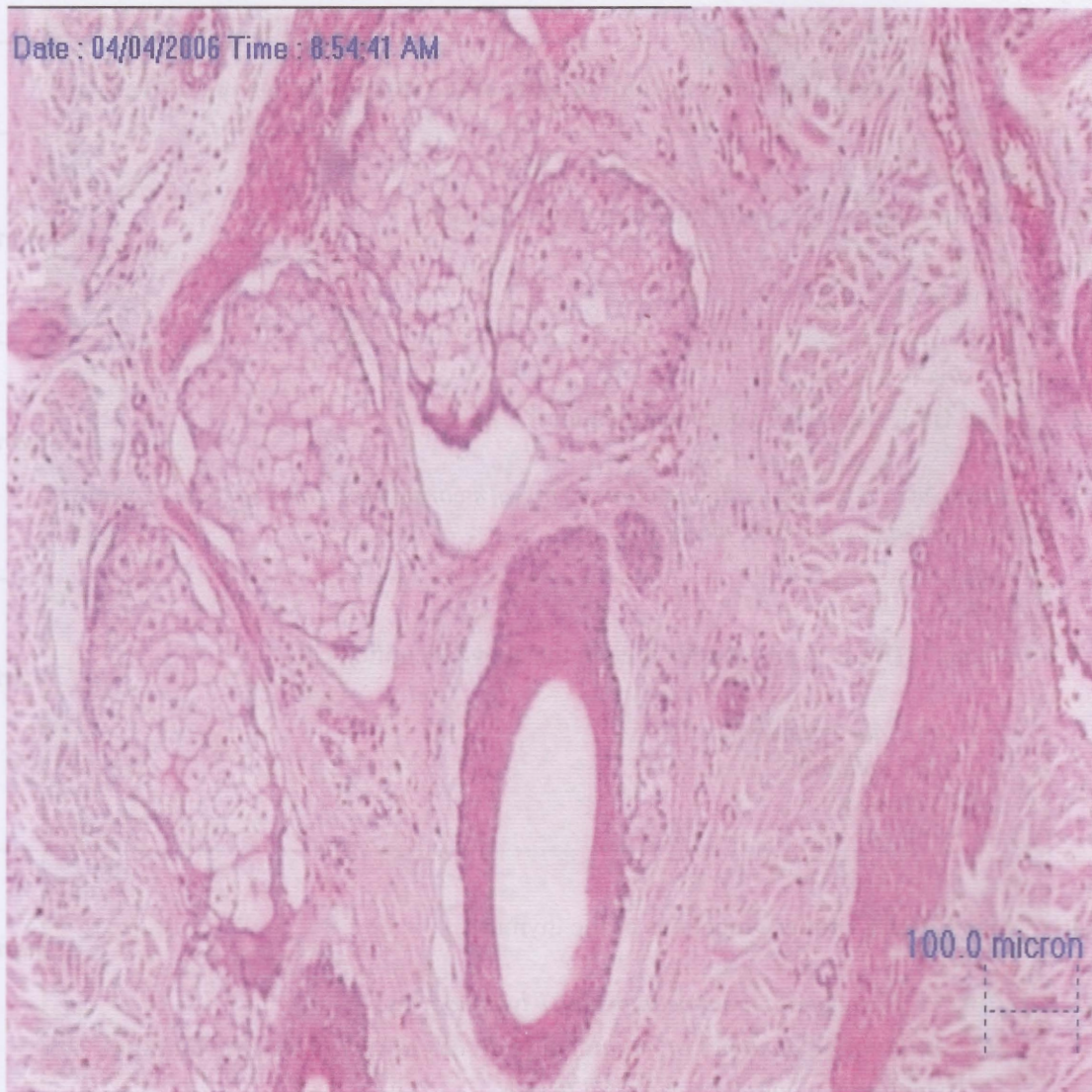


Figure 1.8 Photomicrograph of a section of skin showing a type of gland

Chapter 2 The Lymphatic System

Station No 2.1

Study the photomicrograph or slide of the thymus under the microscope.

2.1 Identify the part of the thymus seen under the field.

(2 marks)

Thymic medulla

2.2 State **ONE** reason for your identification.

(2 marks)

Presence of concentrically lamellated Hassal's corpuscles, some of them forming vacuolated eosinophilic mass.

2.3 Name **THREE** types of cells seen in the above identified part .

(3 marks)

- (i) Reticular epithelial cells*
 - (ii) Macrophages*
 - (iii) Lymphocytes*
-

2.4 List **THREE** primary functions of the thymus.

(3 marks)

- (i) development of immunocompetent T lymphocytes.*
 - (ii) proliferation of clones of mature naïve T cells to supply the circulating lymphocyte pool and peripheral tissues.*
 - (iii) development of immunological self tolerance.*
 - (iv) secretion of hormones e. g Thymosin and other soluble factors which regulate cell maturation, proliferation, and function within the thymus and peripheral tissues. (any three)*
-

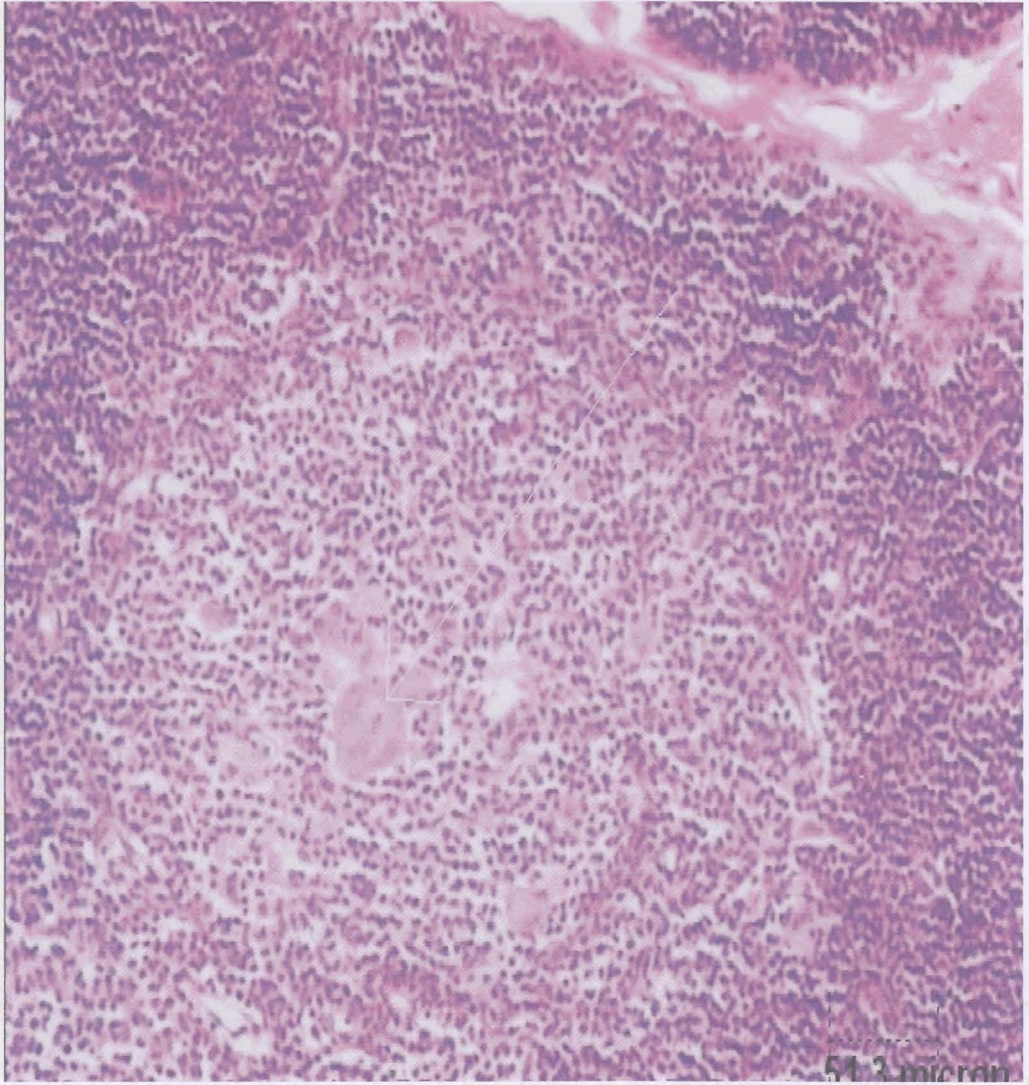


Figure 2.2 Photomicrograph of a thymus